

## Curriculum Vitae

**Personal Data :** Warren William WAKARCHUK

Institute for Biological Sciences  
National Research Council  
100 Sussex Drive, Ottawa, Ontario,  
K1A 0R6  
**Phone:** (613)-952-4299  
**Fax:** (613)-941-1327  
**EMAIL** warren.wakarchuk@nrc.ca  
**Birthdate:** October 19, 1959  
**Nationality:** Canadian

## EDUCATION

1984-87: **Doctorate** in Microbiology from the University of British Columbia, Vancouver, British Columbia. Thesis title: The characterization of the abg ( $\beta$ -glucosidase) gene of an *Agrobacterium*. Research supervisors: Dr. R.A.J. Warren, Dr. R.C. Miller Jr., and Dr. D.G. Kilburn.

1981-84: **Master of Science** degree in Microbiology from the University of British Columbia, Vancouver, British Columbia. Thesis title: The identification and partial characterization of a third recombinant plasmid encoding a cellulase from *Cellulomonas fimi*. Research supervisors: Dr. R.A.J. Warren, Dr. R.C. Miller Jr., and Dr. D.G. Kilburn.

1978-81: **Bachelor of Science** degree in Microbiology from the University of British Columbia, Vancouver, British Columbia. Undergraduate thesis title: Further studies on the detoxification of *Pseudomonas aeruginosa* exotoxin A using glutaraldehyde. Research Supervisor: Dr. D. Syklocha.

1976-78: General science program at the Medicine Hat Junior College, Medicine Hat, Alberta, Canada.

## EMPLOYMENT HISTORY

Promotion to **Senior Research Officer** of the NRC, July 1999.

**Project leader** of the Glycosyltransferase project within the Immunochemistry section of the Institute for Biological Sciences of the NRC.

Appointment as **Associate Research Officer of the NRC** April 1994,

**Research associate** in the laboratory of Dr. Makoto Yaguchi at the NRC laboratories in Ottawa as part of the Protein Engineering Network Centre of Excellence (PENCE). 1990 - 1994

**Post-doctoral fellow** in the laboratory of Dr. Stephen G. Withers. Jan. 1990 - Jun. 1990

**Post-doctoral fellow** In the laboratory of Dr. Christoph F. Beck. Aug. 1987 - Sept. 1989

**EXHIBIT D**

## FELLOWSHIPS

My postdoctoral work in Germany was supported by both Alexander Von Humboldt and Izaak W. Killam postdoctoral research fellowships.

## AWARDS/APPOINTMENTS

- Appointment to the editorial board of the Journal of Biological Chemistry, July 2003
- Entrepreneurship/Innovation award of the NRC Institute for Biological Sciences 1998
- Teamwork award of the NRC Institute for Biological Sciences 1997

## PUBLICATIONS

### Journal articles (Total 61)

1. Yan, F., Mehta S., Eichler, E., Wakarchuk, W.W., Gilbert, M., Schur, M.J. and Whitfield D.M.. 2003. Simplifying oligosaccharide synthesis: efficient synthesis of lactosamine and sialylated lactosamine oligosaccharide donors. *J. Org. Chem.* 68:2426-31
2. Kitov, P. I., Paszkiewicz, E., Wakarchuk, W.W. and Bundle, D.R. 2003. Preparative-scale chemoenzymatic synthesis of large carbohydrate assemblies using alpha (1-->4)-galactosyltransferase/UDP-4'-Gal-epimerase fusion protein. *Methods Enzymol.* 362:86-105
3. Wakarchuk, W.W. and Cunningham A.M. 2003. Capillary electrophoresis as an assay method for monitoring glycosyltransferase activity. *Methods Mol. Biol.* 213:263-74
4. Thibault, P., Martin, A., Gilbert M., Wakarchuk, W.W. and Richards J. C. 2003. Analysis of bacterial glycolipids by capillary electrophoresis-electrospray mass spectrometry: *Haemophilus influenzae* and *Neisseria meningitidis* lipopolysaccharides. *Methods Mol. Biol.* 213:241-59
5. Antoine, T., Priem, B., Heyraud, A., Greffe, L., Gilbert, M., Wakarchuk, W.W., Lam, J.S and Samain, E. 2003. Large-Scale In Vivo Synthesis of the Carbohydrate Moieties of Gangliosides GM1 and GM2 by Metabolically Engineered *Escherichia coli*. *Chembiochem.* 4:406-12
6. Withers, S., Wakarchuk, W.W and Strynadka, N. 2002. One step closer to a sweet conclusion. *Chem Biol.* 9(12):1270-3.
7. St. Michael, F., Szymanski, C.M., Li, J., Chan, K.H., Khieu, N.H., Larocque, S., Wakarchuk, W.W., Brisson J.R., and Monteiro, M.A. 2002. The structures of the lipooligosaccharide and capsule polysaccharide of *Campylobacter jejuni* genome sequenced strain NCTC 11168. *Eur J Biochem* 269(21):5119-36
8. Inzana, T. J., Glindemann, G., Cox, A. D., Wakarchuk, W., and Howard, M. D. 2002. Incorporation of N-acetylneuraminic acid into *Haemophilus somnus* lipooligosaccharide (LOS): enhancement of resistance to serum and reduction of LOS antibody binding. *Infect. Immun.* 70:4870-4879

9. **Karwaski, M. F., Wakarchuk, W. W., and Gilbert, M.** 2002. High-level expression of recombinant *Neisseria* CMP-sialic acid synthetase in *Escherichia coli*. *Protein Expr. Purif.* **25**:237-240.
10. **Ly, H.D., Loughheed, B., Wakarchuk, W.W. and Withers, S.G** 2002 Mechanistic studies of a retaining  $\alpha$ -galactosyltransferase from *Neisseria meningitidis*. *Biochemistry*, **41**:5075-85.
11. **Gilbert, M., Karwaski, M.-F., Bernatchez, S., Young, N.M., Taboada, E., Michniewicz, J., Cunningham, A.-M. and Wakarchuk, W.W.** 2002. The genetic basis for the variation in the lipooligosaccharide of the mucosal pathogen, *Campylobacter jejuni*: Biosynthesis of sialylated ganglioside mimics in the core oligosaccharide. *J Biol Chem* **277**: 327-337
12. **Hood, D.W, Cox A.D, Wakarchuk, W.W, Schur, M., Schweda, E.K., Walsh, S.L., Deadman, M.E., Martin, A., Moxon, E.R., and Richards, J.C.** (2001) Genetic basis for expression of the major globotetraose-containing lipopolysaccharide from *H. influenzae* strain Rd (RM118). *Glycobiology* **11**:957-67
13. **Yan, F., Gilbert, M., Wakarchuk, W., Brisson, J.-R., and Whitfield, D. M.**, 2001. Chemoenzymatic iterative synthesis of difficult linkages of oligosaccharides on soluble polymeric supports. *Org. Lett.* **3**: 3265-3268.
14. **Priem, B., Gilbert, M., Wakarchuk, W. Heyraud, A. and Semain, E.** 2001. A new fermentation process allows large scale production of human milk oligosaccharides by metabolically engineered bacteria. *Glycobiology* **11**: 1-6
15. **van Belkum, A., van den Braak, N., Godschalk, P.C.R., Ang, C.W., Jacobs, B., Gilbert, M., Wakarchuk, W.W., Verbrugh, H., and Endtz, H.P.** 2001: A *Campylobacter jejuni* *cstII* gene associated with immune-mediated neuropathy. *Nat Medicine* **7**:752-753.
16. **Wakarchuk, W.W., D. Watson, F. St Michael, J. Li, Y. Wu, J.R. Brisson, N.M. Young, and M. Gilbert.** 2001. Dependence of the bi-functional nature of a sialyltransferase from *Neisseria meningitidis* on a single amino acid substitution. *J Biol Chem* **276**: 12785-12790.
17. **Persson, K., H.D. Ly, M. Dieckelmann, W.W. Wakarchuk, S.G. Withers, and N.C. Strynadka.** 2001. Crystal structure of the retaining galactosyltransferase LgtC from *Neisseria meningitidis* in complex with donor and acceptor sugar analogs. *Nat Struct Biol* **8**: 166-175.
18. **Blixt, O., J. Brown, M.J. Schur, W. Wakarchuk, and J.C. Paulson.** 2001 .Efficient preparation of natural and synthetic galactosides with a recombinant  $\beta$ -1,4-galactosyltransferase-/UDP-4'-gal epimerase fusion protein. *J Org Chem* **66**: 2442-2448.
19. **Mosimann, S.C., M. Gilbert, D. Dombrowski, R. To, W. Wakarchuk, and N.C. Strynadka.** 2001. Structure of a sialic acid-activating synthetase, CMP-acylneuraminate synthetase in the presence and absence of CDP. *J Biol Chem* **276**: 8190-8196.
20. **Hood, Derek W., Andrew D. Cox, Michel Gilbert, Katherine Makepeace, Shannon Walsh, Mary E. Deadman, Alison Cody, Adele Martin, Martin Månsson, Elke K.H. Schweda, Jean-Robert Brisson, James C. Richards, E. Richard Moxon, and Warren W. Wakarchuk.** 2001. Identification of a lipopolysaccharide  $\alpha$ -2,3-sialyltransferase from *Haemophilus influenzae* *Mol Microbiol* **39**: 341-350.

21. **Creuzenet, C., M. J. Schur, J. Li, W.W. Wakarchuk, and J.S. Lam.** 2000. FlaA1, a new bifunctional UDP-GlcNAc C6 dehydratase / C4 reductase from *Helicobacter pylori*. *J Biol Chem* **275**: 34873-34880
22. **Creuzenet, C., M. Belanger, W.W. Wakarchuk, and J.S. Lam.** 2000. Expression, purification, and biochemical characterization of WbpP, a new UDP-GlcNAc C4 epimerase from *Pseudomonas aeruginosa* serotype O6. *J Biol Chem* **275**:19060-19067.
23. **Linton, D., M. Gilbert, P.G. Hitchen, A. Dell, H.R. Morris, W.W. Wakarchuk, N.A. Gregson, and B.W. Wren.** 2000. Phase variation of a  $\beta$ -1,3 galactosyltransferase involved in generation of the ganglioside GM1-like lipo-oligosaccharide of *Campylobacter jejuni*. *Mol Microbiol* **37**:501-514
24. **Yan, F., W.W. Wakarchuk, M. Gilbert, J.C. Richards, and D.M. Whitfield.** 2000. Polymer-supported and chemoenzymatic synthesis of the *Neisseria meningitidis* pentasaccharide: a methodological comparison. *Carbohydr Res* **328**: 3-16, 2000.
25. **Logan, S.M., J.W. Conlan, M.A. Monteiro, W.W. Wakarchuk, and E. Altman.** 2000. Functional genomics of *Helicobacter pylori*: identification of a  $\beta$ -1,4 galactosyltransferase and generation of mutants with altered lipopolysaccharide. *Mol Microbiol* **35**:1156-1167.
26. **Sujino, K., Uchiyama, T., Hindsgaul, O., Seto., N. O. L., Wakarchuk, W. and Palcic, M. M.** 2000. Enzymatic synthesis of oligosaccharide donors for three retaining  $\alpha$ -galactosyltransferases. *JACS* **122**: 1261-1269
27. **Mehta, S., M. Gilbert, W.W. Wakarchuk, and D.M. Whitfield.** 2000. Ready access to sialylated oligosaccharide donors. *Org Lett* **2**:751-753.
28. **Gilbert, M., J.R. Brisson, M.F. Karwaski, J. Michniewicz, A.M. Cunningham, Y. Wu, N.M. Young, and W.W. Wakarchuk.** 2000. Biosynthesis of ganglioside mimics in *Campylobacter jejuni* OH4384. Identification of the glycosyltransferase genes, enzymatic synthesis of model compounds, and characterization of nanomole amounts by 600-MHz (1)H and (13)C NMR analysis. *J Biol Chem* **275**:3896-3906.
29. **Lougheed, B., H.D. Ly, W.W. Wakarchuk, and S.G. Withers.** 1999. Glycosyl fluorides can function as substrates for nucleotide phosphosugar-dependent glycosyltransferases. *J Biol Chem* **274**:37717-37722.
30. **Zou, W., M. Abraham, M. Gilbert, W.W. Wakarchuk, and H.J. Jennings.** 1999. Allylmalonamide as a bivalent linker: synthesis of biantennary GM3-saccharide--keyhole limpet hemocyanin glycoconjugate and the immune response in mice. *Glycoconj J* **16**:507-515.
31. **Bettler, E., E. Samain, V. Chazalet, C. Bosso, A. Heyraud, D.H. Joziase, W.W. Wakarchuk, A. Imberty, and A.R. Geremia.** 1999. The living factory: in vivo production of N-acetyllactosamine containing carbohydrates in *E. coli*. *Glycoconj J* **16**:205-212.

32. Davoodi, J., W.W. Wakarchuk, W.K. Surewicz, and P.R. Carey. 1998. Scan-rate dependence in protein calorimetry: the reversible transitions of *Bacillus circulans* xylanase and a disulfide-bridge mutant. *Protein Sci* 7:1538-1544.
33. Li, J., P. Thibault, A. Martin, J.C. Richards, W.W. Wakarchuk, and W. van der Wilp. 1998. Development of an on-line preconcentration method for the analysis of pathogenic lipopolysaccharides using capillary electrophoresis-electrospray mass spectrometry. Application to small colony isolates. *J Chromatogr A* 817:325-336.
34. Gilbert, M., R. Bayer, A.M. Cunningham, S. DeFrees, Y. Gao, D.C. Watson, N.M. Young, and W.W. Wakarchuk. 1998. The synthesis of sialylated oligosaccharides using a CMP-Neu5Ac synthetase/sialyltransferase fusion. *Nat Biotechnol* 16:769-772.
35. Wakarchuk, W.W., M. Gilbert, A. Martin, Y. Wu, J.R. Brisson, P. Thibault, and J.C. Richards. 1998. Structure of an  $\alpha$ -2,6-sialylated lipooligosaccharide from *Neisseria meningitidis* immunotype L1. *Eur J Biochem* 254:626-633.
36. Wakarchuk, W.W., A. Cunningham, D.C. Watson, and N.M. Young. 1998. Role of paired basic residues in the expression of active recombinant galactosyltransferases from the bacterial pathogen *Neisseria meningitidis*. *Protein Eng* 11:295-302.
37. Gilbert, M., A.M. Cunningham, D.C. Watson, A. Martin, J.C. Richards, and W.W. Wakarchuk. 1997. Characterization of a recombinant *Neisseria meningitidis*  $\alpha$ -2,3-sialyltransferase and its acceptor specificity. *Eur J Biochem* 249:187-194.
38. Kolkman, M.A., W. Wakarchuk, P.J. Nuijten, and B.A. van der Zeijst. 1997. Capsular polysaccharide synthesis in *Streptococcus pneumoniae* serotype 14: molecular analysis of the complete cps locus and identification of genes encoding glycosyltransferases required for the biosynthesis of the tetrasaccharide subunit. *Mol Microbiol* 26:197-208.
39. Gilbert, M., David C. Watson, and Warren W. Wakarchuk (1997) Purification and characterization of the recombinant CMP-sialic acid synthetase from *Neisseria meningitidis*. *Biotech. Lett.* 19: 417-420
40. Lawson, S.L., W.W. Wakarchuk, and S.G. Withers. 1997. Positioning the acid/base catalyst in a glycosidase: studies with *Bacillus circulans* xylanase. *Biochemistry* 36:2257-2265.
41. Gilbert, M., D.C. Watson, A.M. Cunningham, M.P. Jennings, N.M. Young, and W.W. Wakarchuk. 1996. Cloning of the lipooligosaccharide  $\alpha$ -2,3-sialyltransferase from the bacterial pathogens *Neisseria meningitidis* and *Neisseria gonorrhoeae*. *J Biol Chem* 271:28271-28276
42. Plesniak, L.A., W.W. Wakarchuk, and L.P. McIntosh. 1996. Secondary structure and NMR assignments of *Bacillus circulans* xylanase. *Protein Sci* 5:1118-1135.
43. Plesniak, L.A., G.P. Connelly, W.W. Wakarchuk, and L.P. McIntosh. 1996. Characterization of a buried neutral histidine residue in *Bacillus circulans* xylanase: NMR assignments, pH titration, and hydrogen exchange. *Protein Sci* 5:2319-2328.

44. McIntosh, L.P., G. Hand, P.E. Johnson, M.D. Joshi, M. Korner, L.A. Plesniak, L. Ziser, W.W. Wakarchuk, and S.G. Withers. 1996. The pKa of the general acid/base carboxyl group of a glycosidase cycles during catalysis: a  $^{13}\text{C}$ -NMR study of *Bacillus circulans* xylanase. *Biochemistry* **35**:9958-9966.
45. Wakarchuk, W., A. Martin, M.P. Jennings, E.R. Moxon, and J.C. Richards. 1996. Functional relationships of the genetic locus encoding the glycosyltransferase enzymes involved in expression of the lacto-N-neotetraose terminal lipopolysaccharide structure in *Neisseria meningitidis*. *J Biol Chem* **271**:19166-19173.
46. Lawson, S.L., W.W. Wakarchuk, and S.G. Withers. 1996. Effects of both shortening and lengthening the active site nucleophile of *Bacillus circulans* xylanase on catalytic activity. *Biochemistry* **35**:10110-10118.
47. Davoodi, J., W.W. Wakarchuk, R.L. Campbell, P.R. Carey, and W.K. Surewicz. 1995. Abnormally high pKa of an active-site glutamic acid residue in *Bacillus circulans* xylanase. The role of electrostatic interactions. *Eur J Biochem* **232**:839-843.
48. Sung, W.L., C.K. Luk, B. Chan, W. Wakarchuk, M. Yaguchi, R. Campbell, G. Willick, K. Ishikawa, and D.M. Zahab. 1995. Expression of *Trichoderma reesei* and *Trichoderma viride* xylanases in *Escherichia coli*. *Biochem Cell Biol* **73**:253-259.
49. Wakarchuk, W.W., W.L. Sung, R.L. Campbell, A. Cunningham, D.C. Watson, and M. Yaguchi. 1994. Thermostabilization of the *Bacillus circulans* xylanase by the introduction of disulfide bonds. *Protein Eng* **7**:1379-1386.
50. Wakarchuk, W.W., R.L. Campbell, W.L. Sung, J. Davoodi, and M. Yaguchi. 1994. Mutational and crystallographic analyses of the active site residues of the *Bacillus circulans* xylanase. *Protein Sci* **3**:467-475.
51. Sung, W.L., C.K. Luk, D.M. Zahab, and W. Wakarchuk. 1993. Overexpression of the *Bacillus subtilis* and *circulans* xylanases in *Escherichia coli*. *Protein Expr Purif* **4**:200-206.
52. Oku, T., C. Roy, D.C. Watson, W. Wakarchuk, R. Campbell, M. Yaguchi, L. Jurasek, and M.G. Paice. 1993. Amino acid sequence and thermostability of xylanase A from *Schizophyllum commune*. *FEBS Lett* **334**:296-300.
53. Gebler, J., N.R. Gilkes, M. Claeysens, D.B. Wilson, P. Beguin, W.W. Wakarchuk, D.G. Kilburn, R.C.J. Miller, R.A. Warren, and S.G. Withers. 1992. Stereoselective hydrolysis catalyzed by related  $\beta$ -1,4-glucanases and  $\beta$ -1,4-xylanases. *J Biol Chem* **267**:12559-12561.
54. Wakarchuk, W.W., F.W. Muller, and C.F. Beck. 1992. Two GC-rich DNA elements of *Chlamydomonas reinhardtii* with complex arrangements of directly repeated sequence motifs. *Plant Mol Biol* **18**:143-146.
55. Trier, U., S. Fuchs, M. Weber, W. Wakarchuk, and C. Beck (1989). Gametic differentiation in *Chlamydomonas reinhardtii*: Light dependence and Gene Expression Patterns. *Arch. Microbiol.* **152**: 572 - 577.

56. **Wakarchuk, W., W., N.M. Greenberg, D.G. Kilburn, R.C. Miller Jr., and R.A.J. Warren** (1988). Structure and transcription analysis of a gene encoding a cellobiase from an *Agrobacterium* sp. strain ATCC 21400. *J. Bact.* **170** : 301 - 307 .
57. **Wakarchuk, W.W., D.G. Kilburn, R.C. Miller Jr., and R.A.J. Warren** (1987). The molecular cloning and expression of a cellobiase gene from an *Agrobacterium* in *Escherichia coli*. *Mol. Gen. Genet.* **205**: 146 - 152.
58. **Miller, P. B., W.W. Wakarchuk, and R.A.J. Warren** (1985).  $\alpha$  - Putresinythymine and the sensitivity of bacteriophage  $\phi$ W-14 DNA to restriction endonucleases. *Nucleic Acids Res.* **13**(7): 2559 - 2568.
59. **Wakarchuk, W.W. D.G. Kilburn, R.C. Miller Jr., and R.A.J. Warren** (1984). The preliminary characterization of the  $\beta$ -glucosidases of *Cellulomonas fimi*. *J. Gen. Microbiol.* **130**: 1385 - 1389.
60. **Gilkes, N.R., D.G. Kilburn, M.L. Langsford, R.C. Miller, Jr., W.W. Wakarchuk, R.A.J. Warren, D.J. Whittle and W.K.R Wong** (1984). Isolation and characterization of *Escherichia coli* clones expressing cellulase genes from *Cellulomonas fimi*. *J. Gen. Microbiol.* **130**: 1377 - 1384.
61. **Langsford, M.L., N.R. Gilkes, W.W. Wakarchuk, D.G. Kilburn, R.C. Miller, Jr., and R.A.J. Warren** (1984). The cellulase system of *Cellulomonas fimi*. *J. Gen. Microbiol.* **130**: 1367 - 1376.

#### PATENTS

1. Construction of thermostable mutants of a low molecular mass xylanase. **Warren W. Wakarchuk, Wing L. Sung, Robert L. Campbell, David Rose, and Makoto Yaguchi.** U.S. Patent No. 5,405,769, 1995
2. The  $\alpha$ -2,3-sialyltransferases from *Neisseria* and their uses.. **Michel Gilbert, N. Martin Young, Richard E. Moxon, Michael P. Jennings and Warren Wakarchuk.** U.S. Patent No. 6,096,529, 2000
3. Campylobacter glycosyltransferases for biosynthesis of gangliosides and ganglioside mimics US Patent 6,503,744 2003. **Michel Gilbert and Warren Wakarchuk.**
4. US Patent application 1998: Construction of enzyme fusions and their use in the synthesis of oligosaccharides. **Michel Gilbert, N. Martin Young and Warren Wakarchuk**
5. US Patent application 1998:  $\alpha$ -2,3-sialyltransferase from *Campylobacter jejuni* and its uses. **Michel Gilbert and Warren Wakarchuk.**

#### INVITED PRESENTATIONS

Invited Speaker at the **INPEC 2003 meeting** . Bromont QC, July 25, 2003. Title: Looking towards the Engineering of Glycosyltransferases.

Invited Speaker at the **Glycobiology 2002 satellite symposium**. Boston MA. Nov. 9, 2002. Title: Structure/ function of glycosyltransferases

Structure-Function Relationships of Glycosyltransferases. What have we learned? **Federal Drug Administration (FDA)**, Bethesda MD, USA, March 14, 2002

Structure-Function Relationships of Glycosyltransferases. What have we learned? **University of Guelph**, Dec. 4, 2001

Invited Speaker at the **Fourth International Carbohydrate Bioengineering meeting**. Stockholm Sweden, June 10-13, 2001. Title: Development of Bacterial Glycosyltransferases for Glycoconjugate Synthesis.

Invited Speaker at the **Second International Glycosyltransferases meeting**. Toronto ON, May12-14, 2000. Title: Bacterial Sialyltransferases: More than meets the eye.

Invited Speaker. **Lecture for the Peter Wall Institute for Advanced Studies**. Vancouver BC. June 22, 2000. Title: Bacterial Sialyltransferases

Invited Speaker at the **Society for Industrial Microbiology 50<sup>th</sup> anniversary meeting**, Arlington Va., August, 1999. Title : Oligosaccharides and glycosyltransferases from pathogenic bacteria

**Seminar presentation at the University of Oxford**, July 1996; Title: Cloning and characterization of  $\alpha$ -2,3-sialyltransferase from *Neisseria meningitidis* and *Neisseria gonorrhoeae*

Symposium Speaker: Title: Mutational and Crystallographic analysis of Microbial Xylanases. **Plant Polysaccharide Symposium** Nantes, France July 1996.

## CONFERENCE PRESENTATIONS/PROCEEDINGS

1. Michel Gilbert, Marie-France Karwaski, Anna-Maria Cunningham and Warren W. Wakarchuk. Title: Modulation of the mono- and bi-functional activity of the *Campylobacter jejuni* Cst-II sialyltransferase: a novel phase variation mechanism. **2<sup>nd</sup> International Symposium on Glycosyltransferases**, Toronto, May 2000.
2. Michel Gilbert, Anna-Maria Cunningham, Manuela Dieckelmann, Marie-France Karwaski, Stephen Marshall, Joseph Michniewicz, Melissa J. Schur, Frank St. Michael, David C. Watson, N. Martin Young and Warren W. Wakarchuk. Title: Bacterial glycosyltransferases: their study as potential pathogenesis factors and their use as tools for chemo-enzymatic synthesis of biologically active carbohydrates. **Ottawa Life Sciences National Conference**. November 1998
3. Warren W. Wakarchuk, Anna-Maria Cunningham, David C. Watson, and N. Martin Young. Title: Role of paired basic residues in the expression of active recombinant galactosyltransferases from the bacterial pathogen *Neisseria meningitidis*. **Canadian Society For Microbiology** June 14-18, 1998



4. Michel Gilbert, Anna-Maria Cunningham, David C. Watson, Adele Martin, James C. Richards, and Warren W. Wakarchuk. Title: Characterization of a recombinant *Neisseria meningitidis*  $\alpha$ -2,3-sialyltransferase with a novel acceptor specificity. **XIV international glyconjugate conference in Zurich Switzerland, Sept 7-12, 1997**
5. Warren Wakarchuk, Anna Cunningham, and Michel Gilbert. Simple synthesis of fluorescent substrates for a capillary electrophoresis based assay of glycosidases and glycosyltransferases using commercially available aminophenylglycosides. **XIII International symposium on glycoconjugates, August 20-26, 1995, Seattle, U.S.A.**
6. W. Wakarchuk, R. Campbell, W. Sung, and M. Yaguchi. Structure of the active site from a xylanase of *Bacillus circulans*. Oral presentation at the **Canadian Federation of Biological Societies, 36th annual meeting, June 1993, Windsor Ontario.**
7. W. Wakarchuk, N. Methot, P. Lanthier, W. Sung, V. Seligy, M. Yaguchi, R. To, R. Campbell, and D. Rose. The 20 KD Xylanase of *Bacillus subtilis*: A Structure/Function Analysis. **Xylan and Xylanases** J. Visser et al ed. Elsevier , 1992. pp 439 - 442
8. M. Yaguchi, C. Roy., M. Ujiie, D. C. Watson, and W. Wakarchuk. Amino Acid Sequence of the Low Molecular Weight Xylanase from *Trichoderma viride*. **Xylan and Xylanases** J. Visser et al, ed. Elsevier , 1992. pp 149 - 154.
9. W. Wakarchuk, N. Methot, W. Sung, V. Seligy, and M. Yaguchi . Structure/Function relationships in the low molecular mass xylanase of *Bacillus subtilis*. Oral presentation to the **American Chemical Society Symposia, Biochemical Technology Section, August 29, 1991**
10. W. Wakarchuk, E. D. v. Gromoff, and C. F. Beck. Identification of v-myc homologous genes in *Chlamydomonas reinhardtii*. Poster presented at the **Cell and Molecular Biology of Chlamydomonas reinhardtii meeting, Cold Spring Harbor, New York, May, 1988**

#### CONTRIBUTION TO TRAINING OF HIGHLY QUALIFIED PERSONEL

Michel Gilbert Research associate from 01/1995 to 12/2001 promotion to Associate Research Officer of the NRC 12/2001.

Stephan Bernatchez PDF from 09/2000 to 01/2003 promotion to Assintant Research Officer of the NRC 02/2003

Christine Syzmanski Research associate from 09/2000

Manuela Dieckelmann PDF from 08/1998 to 08/2000 now at U. of Queensland Australia

Sukhoon Koh PDF from 02/2000 to 02/2003

Scott Dick PDF from 06/2001 to 06/2004